Shall we Preach what we Practice? Incorporating Quantitative Methods in non-Methodological Courses.[1]

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Abstract

Opposing the increasing importance of quantitative data in society is the observation that many students in the social sciences have a fear of quantitative methods. To ensure math-averse students acquire the necessary quantitative skills, we propose a curriculum-based approach whereby a learning trajectory of quantitative methods is integrated in the non-methodological courses of the program. A structured integration of such methods can ensure repeated exposure to applications of such methods in a context of their interests. Moreover, the use of a learning trajectory enables students to encounter "learning activities" with gradual increasing complexity providing stepping stones rather than stumbling blocks. This paper describes the Learning Trajectory of Quantitative Methods and discusses both lecturer and student experiences with the proposed innovation thereby providing an in-depth assessment of the benefits and challenges with the integration of a curriculum-wide learning trajectory.

Introduction[i]

With the incorporation of courses on quantitative methodology in most European political science programs we have seen the concomitant rise of a particular problem among our students: statistics anxiety. As soon as students see a graph, a table or – heaven forbid – the output of a regression analysis in a presentation, they zone out until the lecturer is finished with his explanation and they hear him say "*To summarise …*", which is perceived as the cue to start taking notes again. But this phenomenon is not restricted solely to the political science discipline and the problem goes beyond

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mere indifference. Research shows that a majority of all university students suffers from statistical anxiety or "anxiety that occurs when a student encounters statistics in any form and at any level" (Onwuegbuzie & Wilson, 2003: 196). The contrast between their fear of statistical methods and the growing role of quantitative data in political science research and practice warrants our concern. The fact that many students perceive quantitative methods courses as inherently uninteresting and isolated from the substantive courses of their program may also indirectly contribute to their anxiety. Because students do not realise the relevance of statistics for political research, they avoid taking any electives on quantitative research methods (Bridges, Gillmore, Pershing, & Bates, 1998; Onwuegbuzie & Wilson, 2003; Scheel, 2002; Wilder, 2009).

As statistical anxiety is often translated into an inability to acquire quantitative skill, the political science discipline is faced with a serious problem: graduates are thrown into a professional environment, either as researcher or in a more practical political career, where they are confronted with all kinds of quantitative and numerical data that need critical interpretation and manipulation. Research has shown that statistics are the most commonly used method in several top American political science journals (Bennett, Barth, & Rutherford, 2003; Mahoney, 2007; Pierson, 2007).

If students want to read and critically assess these articles, it is crucial that they are at the very least somewhat familiar with the most commonly used statistical principles and processes. Unfortunately a large portion of recently graduated political scientists is not, either because they have not acquired the necessary skills or because they have lost them along the way. Indicative of this trend is that only 5.7% of the master students at our faculty used numerical data in their master's dissertation and that many of the newly hired PhD-students lack these aforementioned skills and require (re-) training. These observations have created the necessary support among our faculty members to seek for a solution. Because whatever fear of numbers and graphs students may experience, "being able to read and evaluate claims made on the basis of statistical evidence and being able to use quantitative data to answer questions and draw conclusions are skills that will benefit students in their careers, in future studies, and as citizens in an increasingly data-saturated world." (Andersen & Harsell, 2005: 17).

The question then becomes: How can we ensure that students *do* benefit from these courses and overcome their fear and concomitant aversion of statistics? In our political science program we have sought to address this problem through the integration of a learning trajectory of quantitative methods in non-methodological courses.

Evidently, the problem of quantitative literacy, numeracy, quantitative reasoning or "the ability to understand and use numbers and data in everyday life" (Wilder, 2010: 227) is nothing new.

Generations of lecturers and educational scientists before us have observed that students struggle with quantitative methods. Many among them have documented the different remedies (and failures). A brief overview of this literature will be provided in the first section. Building upon these experiences, we developed a course cross-over approach to address statistical anxiety among our students. This approach will be the focus of the second section. The third section discusses the experiences of the involved lecturers and students and the fourth concludes with a reflection on our experiences, the challenges encountered and lessons we like to share with those interested in pursuing a similar project.

1. In Search of a Solution

Even though it is not possible to address all factors underlying statistics anxiety within an educational context, several solutions have been developed to help students overcome their fear of statistics and to make quantitative methods more attractive – or at the least less repulsive. Two methods feature prominent within the literature; the first approach focuses on improving specific methodological courses whereas the second seeks to embed quantitative methods in substantive courses throughout the curriculum.

Improvements within methods courses

Most research on introductory courses to statistical methodology draw inspiration from the constructivist theory of learning. They stress the use of simple examples that relate to the students' sphere of interest, the use of real data and the gradual introduction of complexity. They also stress the need to focus on political or sociological interpretation rather than difficult mathematical computations (i.e. a focus on teaching statistical reasoning rather than statistical methods) and plead for an active involvement of students in participatory knowledge production.

Interactive teaching methods are also considered as a means of improving students' understanding of statistics. When students are actively involved in the learning process, they learn more quickly and develop critical thinking skills. Moreover, their long-term retention is improved (Adeney & Carey, 2011; Bradstreet, 1996; Garfield & Ben-Zvi, 2009; Hewitt, 2001; Janda, 2001; Lewis-Beck, 2001; Markham, 1991; Pan & Tang, 2004; Scheel, 2002). The main goal of these techniques is to get students to recognise the value of statistics for political and social science while at the same time enhancing their quantitative skills.

But in many cases, the room for improvement within methodological courses is constrained. Large and diverse groups can limit the possibility to organise hands-on practice sessions or use examples that refer to the students' sphere of interest. This is the case for the instruction of quantitative

methods within our faculty, where over 400 students from 4 faculties enrolled in 13 different programs are participating in the course.[ii] Even if we were able to incorporate all suggested improvements with the statistiscs courses, the fragmented nature of the methods curriculum and the ensuing risk of isolation remain a challenge. Unless we introduce additional (compulsory) statistics courses in the later years, long term retention of the acquired skills may still be at risk. For this purpose, course cross-over approaches aimed at introducing methodological teaching throughout the whole political or social science curriculum might be better suited.

Embedding quantitative methods in substantive courses

Weiss (1987) was –to our knowledge- among the first to signal the need for making students realise the inevitable link between methodology and substance in social sciences. Not much later, Markham suggested to frequently and repeatedly incorporate methological issues into substantive courses, in order to counter sociology students' lack of basic statistical skills and to make them aware of the centrality of research within social siences (Markham, 1991). This approach, he argued, should help students to keep in touch with statistics between the specific lectures on methodology and to build cumulative knowledge, while at the same time allowing them enough time to assimilate the material. Other authors have followed Markhams' reasoning (See also: Adeney & Carey, 2009; Adeney & Carey, 2011; Bridges, Gillmore, Pershing, & Bates, 1998; Payne, Lyon, & Anderson, 1989; Zablotsky, 2001). Even though these authors made the case for taking methodology courses out of their isolation early on, only a few researchers have taken up the challenge to effectively implement this innovation. Those who did, often proceded in a piecemeal and ad hoc manner, with one notable exeption: the Integrating Data Analysis (IDA) Project.

Based on the American Sociological Association's Minority Opportunities through School Transformation (MOST) Program, the IDA Project sought to introduce quantitative methods in sociology courses throughout the curriculum. The project emphasised two elements: integrating scientific reasoning into the curriculum at the departmental level rather than working with individual course changes, and introducing active, inquiry-based learning (Howery & Rodriguez, 2006). Research on the effectiveness of the project suggests positive outcomes, although some difficulties are unveiled as well (Atkinson et al., 2006; Howery & Rodriguez, 2006; Wilder, 2009, 2010).

Notwithstanding the project's merits, two particular components make it rather unsuitable for our situation. Firstly, the project mainly focused on undergraduate students (i.e. at the bachelor-level), while continuity with the graduate or master level is equally important. Secondly, the learning modules created were largely based on US Census data. This sociological focus makes the project quite specific, leaving the need for broader application of these techniques unanswered. The

following section introduces the aims and content of the LTQM and compares them with those of the IDA Project.

2. Overcoming Statistics Anxiety: The Learning Trajectory of Quantitative Methods

In order to remedy the problems of statistical anxiety and lacking quantitative skills in political science education, a project was initiated that focused on the development and implementation of a Learning Trajectory of Quantitative Methods (LTQM) intended to introduce a curriculum-based and progressive learning approach to quantitative methods.

A Learning Trajectory

The LTQM consists of four hierarchically inclusive stages that represent four progressive steps in the learning process. These steps largely correspond to the normal steps distinguished when engaging in (quantitative) research:

1. **"From concept to variable"**

   In the first stage of the learning trajectory students learn to transform an abstract concept into a measurable indicator. The emphasis is on the operationalization stage of the research process whereby students are made aware that for each concept, multiple indicators are possible, each with their own strengths and weaknesses.

2. **"From variable to data"**

   Once an operationalization of the concept has been chosen made, students learn to look for the appropriate data. Given limitations on data-availability, previous choices might need to be re-evaluated.

3. **"From data to descriptive statistics"**

   A first step in analysing data consists of descriptive statistics. Students learn to interpret graphs and tables, select the most appropriate (visual) representation and draw meaningful conclusions from their data.

4. **"From descriptive to analytic statistics"**

   In the last step, students learn to execute and interpret analytic (inferential) statistics. At this stage, we also expect students to evaluate and scrutinise quantitative analyses published in political science research articles.

It is important to mention, though, that both in corresponding with the participating lecturers as in relation to the students, the project emphasised that the choice of method should be determined by the research question. Selecting the appropriate method can therefore be considered a 'preparatory step' in the learning trajectory. The implementation of the LTQM is accomplished by introducing Learning Activities (LAs) within courses throughout the curriculum. In each course, we aspired to

introduce three LAs. This prevents that the LAs would be a one-shot course element and allows students to practice quantitative methods more often, which promotes long-term retention and a better understanding of quantitative methods.

The Guiding Principles

Our approach is guided by a number of principles, based on the experiences of previous scholarship on teaching and learning. First, the project seeks to instil in the students a reflex to consider quantitative methods as an equally valuable option to qualitative methodology: it is the research question that determines this choice and not the personal preferences of the researcher. Therefore students should stop seeing methodology and theory as two separate components of their education and should view both as mutually constitutive parts of their educational and professional environment. By gradually and implicitly exposing students to statistical material in a wide variation of substantive courses, we aim to nourish this positive attitude towards and better understanding of statistics. Using real-life examples that tie in with the students' spheres of interest is *a conditio sine qua non* in this regard.

Secondly, the LTQM makes use of gradual exposure to increasingly complicated applications. This is important to avoid potential backfiring. Repeatedly confronting students with the full complexity of the subject pushes them to directly face their fears, which can strengthen rather than weaken their statistics anxiety. Students' *and* lecturers' prior knowledge, abilities and limitations need to be taken into account when devising learning activities that aim to introduce quantitative material in a theoretical lecture.

Thirdly, it is particularly important to note that the project does not intend to repeat or replace the programme's existing methodological courses, rather the contrary. By ensuring recurrent contact with quantitative data (analysis) in a wide range of courses throughout the programme, statistical skill retention is fostered and the students' long-term knowledge is strengthened (Scheel, 2002). In our program, methods courses are only taught in the first two years. In order to make sure students do not lose the skills they acquired in those courses, they must be challenged to apply them in the later years as well.

Fourthly, the LTQM is designed to promote active participation and interaction between lecturer and student, thus making students "creators of knowledge rather than mere recipients" (Lewis-Beck, 2001: 8).

Finally, the LTQM also helps building a more horizontal curriculum. This happens not only through tearing down the walls between methodological and substantive courses but also by stimulating dialectical thinking and developing students' capacity to integrate and apply knowledge learned in

two separate courses (Blalock, 1989; Wilder, 2009). Realising that they actually understand and are able to interpret those graphs and numbers based on prior knowledge acquired in another course also helps students to build confidence in their academic capabilities and achievements.

Creating Learning Activities

Using a Teaching Assistant to develop learning activities for somebody else's courses requires close cooperation with the participating lecturer. Therefore, we developed a modus operandi that allowed for close interaction between the project team (mainly the central TA), and the faculty members who volunteered to participate. Even though the initiative for this project originated within the political science faculty, the cooperation with the educational development unit of our university proved invaluable in view of the teaching methods used for implementing the learning activities.

Example Learning Activity for External Dimensions of EU Policies "One Europe, One Vote"*

Type: Assignment

Stages in the LTQM:

Step 1: From concept to variable

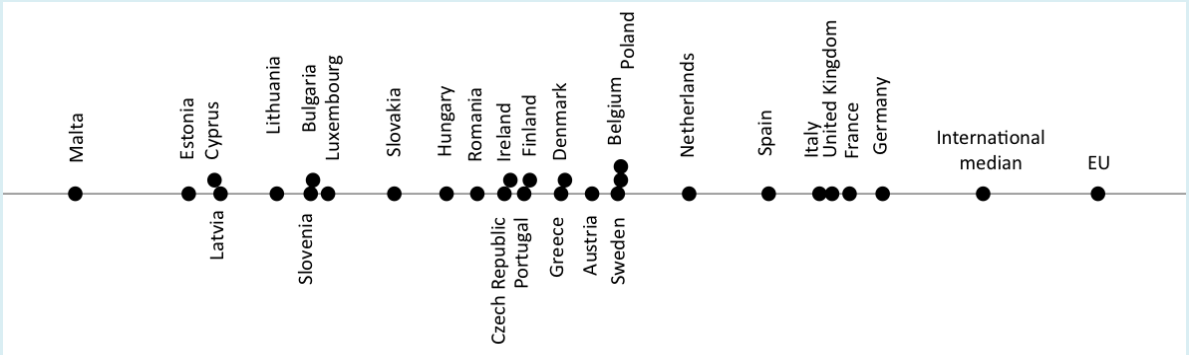
Step 2: From variable to data

Step 3: From data to descriptive statistics

Description:

For this assignment students have to read Frieden's (2004) article: "One Europe, one vote? The Political Economy of European Union Representation in International Organizations". They have to apply the argument of this article to a hypothetical WTO. First students need to select one sole indicator of preferences in trade liberalization and argue why they choose that particular indicator. Next students have to map the preferences of the countries under consideration on a spatial model. Based on these models, students have to indicate which EU countries are opposed to or in favour of pooled representation in the WTO and explain why.

Example of a spatial model students are expected to construct:



*The full version of this LA can be found on the projects' website: http://soc.kuleuven.be/epos

We always started the development process by scanning the lecturer's existing course material for quantitative data or themes that could be used for the introduction of new quantitative material. Based on this first exploration, we started designing learning activities. In doing-so we tried to draw from instructional principles drawn from the literature on teaching statistics (Cobb & McClain, 2004;Garfield & Ben-Zvi, 2009; Hulsizer & Woolf, 2009). More specifically, we defined interesting and relevant questions for which the answer would direct students towards the use of quantitative data. Once drafts of the LAs were available, these were discussed with the educational development unit of the university. This broadened our perspective on the various ways through which the material could feature in a class context. It also helped to assess the limitations as to what we can expect from students *and* lecturers. Refinements were often discussed a second time until the resulting LA was polished. At this stage, the LAs were presented to the faculty member responsible for the course. (S)he was asked to provide feedback concerning the appropriateness for the course and the perceived feasibility for students and lecturer. These comments were subsequently incorporated in order to prepare the LA for implementation[iii]. For each course, we aspired to develop a greater number of LAs than the two or three we had asked lecturers to integrate. This left room for lecturers to choose the LAs they felt most comfortable with and that they perceived as best suited for their course, the student body and their teaching style. Once the LAs were selected, implementation could begin. All developed learning activities can be consulted in a database located at the project's website.[iv]

Although the steps of the LTQM are described in a linear fashion, they were not implemented as such. If we had postponed the use of LAs in which students have to work with analytic statistics, students would not have been given sufficient opportunities to practice and develop such skills. There is, however, a general shift in the relative weight of the different components of the LTQM throughout the political science curriculum. In the first years, the main focus lies with the first steps and a lot of guidance is provided. Later in the program, the focus shifts to descriptive and analytical statistics with the students doing and/or interpreting the analyses independently.

After implementation, feedback was collected from lecturer and students so that the activities could be reviewed and adjusted accordingly for future use. Such re-evaluation occurred the five involved courses. All of the changes made to the learning activities can be found in the constructed database, along with a motivation behind the changes.

When comparing the LTQM to the IDA Project mentioned above, two main differences can be distinguished. With regard to the chosen working format, the IDA Project is quite reliant on lecturers taking the initiative to participate in the program. In contrast, the LTQM's central TA is part of the

faculty staff and therefore has the opportunity to approach lecturers that might be open to participating but would have never engaged in such activities if they had to develop them themselves. Furthermore, the IDA Project is more organised in a top-down manner, as its departmental focus implies moving "the locus of control from the individual faculty to the department level" (Howery & Rodriguez, 2006: 27). The LTQM on the other hand emphasises that the lecturer teaching the course remains the main locus of control, while at the same time maintaining course cross-over goals by means of the learning trajectory. Concerning the substantive or theoretical demarcation, the LAs developped by the LTQM are centered around political science while the IDA project's learning modules focus mainly on the sociological research field.

3. From Theory to Practice: Lecturer and student experiences

The LTQM was implemented in a total of five courses by four faculty members. By the end of the project, an additional two faculty members agreed to participate as well. For their courses, learning activities have been developed, but still require implementation and evaluation. To evaluate lecturers' experiences with the LTQM, we conducted in-depth interviews. For all five courses we also organised focus groups with students to inquire into their experiences with the implemented learning activities.

Lecturer experiences

Confronted with the question why they decided to participate, the lecturers indicated to have done so either because they acknowledged the problem of statistical anxiety among students or because they saw the added value of the course cross-over approach for the students' education. The support offered by the project's TA was also a factor that proved decisive for all (future) participants regardless of their familiarity with quantitative material. Knowing that someone would be there to provide the initial impetus for the LAs and help them figuring out how these could be implemented, was essential for convincing lecturers to participate. In addition, the information from the university's educational development unit was very helpful to find out which teaching methods could be used, as this was an issue that many lecturers encountered.

As we developed multiple LAs per course, the responsible lecturer could decide which LAs to implement. The main factors that played a role in the selection of LAs were time constraints, expected workload and the characteristics of the student group. For instance, the course 'International Organization' had a very tight teaching schedule that made it rather difficult to incorporate a half-hour discussion about one article or graph. The lecturer instead used the developed LAs as

illustrations to make the students aware of the possibilities of using numbers in researching international organizations. Several of the assignment-LAs were not selected due to the expected increase in workload that the evaluation of these assignments would entail. Another factor for the non-selection of these assignments was the fact that the statistical knowledge of the students was too diverse to expect all of them to deliver an assignment of the same quality. The size of the student group also prevented some LAs from being selected for implementation.

The diversity proved to be a problem for the implementation of the LAs as well. The lecturer of 'Political Sociology' chose to organise optional SPSS lectures to reduce the gap between statistically apt and less experienced students, while in 'International Political Economy' and 'External Dimensions of EU Policies' extra online information and tutorials were provided.[v] For 'Comparative Politics', the size and heterogeneity of the student group caused time management issues during the implementation of in-class LAs.

With regard to teaching methods it became quite clear that the more statistically advanced LAs are, the higher the need for interactive teaching becomes. It also took some trial-and-error to figure out how to present the statistical material as clearly as possible, in order to show students that it is not as hard as it seems. Several lecturers struggled to find the right balance between statistical terminology and mathematical complexity, and at the same time trying to make students realise that statistics is nothing to be afraid of. However, on a positive note, for some lecturers using quantitative material became instrumental to explain the course content more clearly.

When assessing students' reactions to the LAs, several lecturers indicated that students' were more cooperative towards the end of the semester – a sign that repeated contacts do have an effect – and that they felt that, by using quantitative materials, students also got a better understanding of the course content itself. In a number of courses, the lecturer noticed that students really engaged with the LAs and were interested in the data. Their increased statistical aptness also showed through in the exams that included a statistics-related question: these were remarkably better answered than during previous years.

This brings us to the lessons learned and the resolutions taken for the following years. Despite some problems, all participating lecturers intend to develop more LAs like the ones from the project, for a variety of reasons.[vi] Most lecturers indicated that, even though the development and implementation of the LAs required an investment of scarce time, there has been a net-gain in terms of students' understanding of statistics the course contents. All lecturers have also extended their knowledge of statistics and have more confidence in working with statistics in class. Those lecturers, who had previously been rather sceptical or indifferent of statistics, even adjusted this position to a very

positive one. The faculty have gotten a better idea of the ways in which they can bring quantitative materials into their classes and are more conscious of the need to convey these elements as clearly as possible to the students. Their overall positive experience and conviction of the enrichment of the LAs has led them to continue applying and developing LAs and to explore options for including similar LAs in other courses.

Student experiences

Students' reactions vary over the different courses but in general they were positive of all participating courses. As regards the use of graphs and tables during the lectures, students indicated that this helped to spice up what would otherwise be quite blend and stand-alone theoretical course material. Especially for 'International Organisation' and 'Comparative Politics', the students appreciated the quantitative components as interesting visualisations and illustrations of pertinent issues and trends. They perceived the incorporation of graphs and tables as a useful tool for studying the material of all courses.

Students perceived operationalisation exercises as very useful to practice basic research skills such as critically reflecting about which indicator to use and developing an argumentation to defend this choice.[vii] One student also indicated that it was an eye-opener in the sense that it made her realise that several good indicators exist for answering the same question and that there is not just one ideal answer. Regarding the more practical aspects, students noted that they learned how to collect data from online resources and how to translate this data into graphs.

But they did not acquire these skills without striking a blow. Most students faced difficulties finding the relevant data and conducting the analyses, especially when the use of (specialised) software was required to perform the exercise. For one group assignment – where students had to do statistical analyses with SPSS to test a hypothesis – there were also problems with the analyses themselves. Less experienced students mentioned that their statistical knowledge was insufficient to complete this assignment on their own.

Regarding the lecturers' approach to the quantitative material, students' indicated that all lecturers had handled the explanation very well. They liked it when the lecturer engaged with them interactively, although some students' were not so fond of lecturers asking them questions directly. Nevertheless, even these students admitted that, despite their unease to answer questions in front of the whole student group, they did not see how introducing advanced statistical LAs would be possible without such an interactive teaching format.

Leaving no student behind, unfortunately, often comes at a cost. In almost all focus groups, students mentioned the heterogeneity of the group as an impediment during classes. It often took longer for

students who did not have an elaborate background in statistics to understand the LAs, which sometimes annoyed the more experienced students. Enabling differentiation in LAs to present a challenge for all students might therefore be an appropriate remedy.

When asked whether their attitude towards quantitative methods had changed, students answered positively. But opinions varied between students. One student noted: "At first I was a little apprehensive of the statistical parts of the course (Political Sociology) but it was well explained and my statistical knowledge was enhanced a lot. I now find it interesting to be able to interpret regression results but I still do not like doing such analyses on my own". On the other hand, another student, who also did not have any statistical experience beforehand, remarked that she now was much more open to actually conduct statistical tests herself.

Overall, the students that were enrolled in any of the participating courses benefitted from the presence of the LAs in those courses. They developed several new understandings and acquired new skills or improved existing ones; skills which students consider transferrable both to other courses as well as outside the educational context. The students pointed out that they obtained a better understanding of how to scrupulously handle quantitative and statistical elements in scientific research. As to their skill-development, several students indicated an increased confidence in working with statistics. Some aspects of the assignments caused trial-and-error problems, but afterwards the students felt that they would not encounter these problems anymore, should they be asked to do similar exercises. As such, these LAs did effectively address several latent skills and changed students' perceptions about statistics.

4. Discussion & Reflection

Following the experiences of the involved lecturers and students, we can draw some lessons that might be useful for those aspiring to start up a similar project. To structure this discussion, we distinguish between three components. First the organizational set-up will be evaluated: "What are the advantages and disadvantages of a learning trajectory and an external TA?" Secondly, we will look at the largest need identified by lecturers and students: educational support. Thirdly, we will elaborate on the possibilities to continue applying and developing LAs after the project has ended.

Organizational set-up

As discussed in the second section, we are not the first to have proposed the integration of methods within the broader curriculum. What sets our project apart from the previous proposals is the use of an explicit learning trajectory and having a TA develop the learning activities. We identify four main

advantages of this chosen set-up but we also experienced a number of challenges that are intrinsically related with it.

Lecturer participation to the project was positively influenced by the support from the involved TA and our belief and reassurance that each could contribute to the goals of the project without moving (too much) out of their comfort zone. As such, the LTQM set-up can convince,stimulate and encourage lecturers to think out of the box (external TA) but still allows for a certain degree of freedom in the complexity (learning trajectory). A second advantage is the ability to **reach a substantial portion of the student population**. By having five participating courses spread throughout the curriculum, we ensured gradual exposure to increasingly complex applications. However, in cases where expectations were too high student's anxiety was exacerbated. This reflects an enduring challenge within the project's set-up: being too cautious slows down the learning process, but being too ambitious heightens students' anxiety. The availability of a learning trajectory can facilitate this balancing exercise. A third advantage of the LTQM is the **coherence** in the manner by which the various lecturers introduce quantitative research methods in their courses. As the creation of (almost) all learning tasks involved cooperation with the project's team, it was possible to foster a certain degree of coherence among the various learning tasks. The final advantages are the **spillovers** associated with the project. Not only did many of the involved lecturers start to integrate quantitative learning tasks in their other courses, rumours of the project also led other lecturers to apply the ideas of the LTQM. Another spillover is the receptiveness of the involved staff to take up alternative innovations in their educational practice. Lecturers actively sought for innovative ways to introduced student-driven methods within the large and often diverse student groups. The support we enjoyed from the educational services from the university made us aware of the possibilities in this regard and the project provided a platform to disseminate these experiences.

Whereas the potential added value of delegating the task to a TA has been elaborated above, there are also certain risks involved. That is: success of our project depends to a large extent on the Teaching Assistant (TA) hired to perform the job. Addressing the various needs identified by the lecturers, detecting potential learning opportunities or treating eventual sensitivities is crucial for maintaining a constructive relation with the lecturers participating in the project. The need for such support became a key issue over the course of the project and will be elaborated in the following section. Good social skills and pro-activeness are important to ensure that the developed LTs meet the demands by the lecturers who need to implement them. Just as the involved lecturers depend on the TA for quality input, so too does the TA depend on the willingness of the lecturer to cooperate with her or him and provide the trust necessary for a successful integration of the developed LTs. To foster such trust, we believe it is recommended to organise regular discussions with staff and the TA to facilitate the

exchange of opinions, the voicing of concerns or the resolving of potential problems at the earliest possible stage.

This also leads to a second challenge we encountered. And that is the observation that communication is vital. Lecturers indicated they would have preferred regular updates on the project's proceedings, be it a short e-mail inquiring of how the implementation of an LA went or regular discussions in person. While a workshop – providing opportunities to share experiences – was organised towards the end, the project would have benefitted from a common forum to voice concerns not only with regards to their own teaching practice but also regarding the project itself.

Importance of Support

One of the most important challenges we encountered throughout the project was the need to provide sufficient support for both students and lecturer. **For students**, we found that addressing statistics anxiety also implies adressing a number of related anxieties. When confronted with a task such as the construction of a graph or the execution of a regression it became clear that many students were not familiar with the software packages customarily used to perform basic descriptive analysis let alone more advanced statistics. Provision of hands-on sessions, an online tutorial or good references proved to be no excessive luxury.

Lecturers requested additional support mainly in the teaching practice. To foster skill acquisition, the preferred method of instruction is student-centric: students learn from practice. However, this also comes at a cost. For instance, organising hands-on sessions for a 150 student class means that a session will have to be reiterated five times when we can only accommodate 30 students in a computer lab. When giving assignments, lecturers need to correct and – ideally – provide feedback for 60 to 300 papers. But also within class lectures, interactive teaching often requires additional support. For example, during class discussions it might be desirable to have assistants chair various sub-groups. A second area were support for lecturers was required, pertains to the instruction of quantitative learning tasks to a rather math-averse audience. How can we discuss a graph so that everybody grasps its content? How far should we go in explaining statistical concepts? The lecturers involved in the project struggled with these questions through trial-and-error but a project similar to ours is likely to benefit from direct interactions between lecturers and educational support services.

Sustainability

As the project approached its formal ending, the question of the **sustainability of the proposed reforms** came to the fore. If the implementation of LAs is contingent on the provision of support,

chances are high that once the TA's contract has ended, many LAs would be taken out of the course again. Our experience in this regard has been twofold. On the one hand, all lecturers indicated their willingness and increased confidence to continue applying the LAs, as well as further developing their own. On the other hand, of all the LAs with which we encountered problems, a large majority was not (fully) implemented due the increased needs for either lecturer or student support.

How can we ensure that the spirit of the project lives on without additional support mechanisms? The solution may be found in the strenghtening of the cooperation among faculty members. Creating a recurrent forum in which data, teaching practices and experiences can be shared can lower the threshold to engage in new innovations or maintain existing ones. It is important that such platforms are broadly conceived and incorporate the methodological staff as well as the university's educational support services. The defined learning trajectory can also be a great help: not all lecturers need to incorporate complex regression analysis in their course work. Students also profit from recurrent contacts with graphs in lectures, without having to write a paper where they have to do statistical analyses themselves. The key to a successful legacy of our project is that lecturers realise the value of acquainting students with quantative materials and that each faculty member does his part to help fill this void in the current knowledge of our students.

Notes

[i] This paper represents a shortened version of an extensive project report which can be consulted at http://soc.kuleuven.be/epos

[ii] Restructuring the methods courses in such a way that each program has their own customised course would imply a multiplication of the required teaching staff. This requires adjustments to the allocation model between faculties and among faculty staff.

[iii] As will be clear from the testimonies, this final –yet crucial – step was not always executed thoroughly.

[iv] For more information see: http://soc.kuleuven.be/epos

[v] The reason why these seminars were organised for 'Political Sociology', is because the statistical component in this course constitutes a major part of the course content and is quite complex. While the political science students are actually quite well prepared for this (the course is situated in the third bachelor year, so material from the first and second bachelor year methods courses is still quite fresh), enrolment is also allowed by students who have not had the same methodological preparation. This reinforces the quantitative literacy gap in the student group extensively.

[vi] Several participating lecturers also teach other courses at our university and are exploring options to include more quantitative material in these courses.

[vii] These exercises were: the democracy exercise from 'Comparative Politics', the Frieden exercise from 'External Dimensions of EU Policies' and the Ikenberry assignment from 'International Politcal Economy'. Detailed information about these LAs can be found on the project's website.

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